NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

UNDERGROUND OUTLET
(ft)
CODE 620

DEFINITION

A conduit installed beneath the surface of the ground to collect surface water and convey it to a suitable outlet.

SCOPE

This standard applies to underground conduits designed to dispose of excess surface water. It does not apply to trickle tubes or to principal spillways in ponds or to Subsurface Drains (606).

PURPOSE

To dispose of excess water from terraces, diversions, subsurface drains, surface drains, trickle tubes or principal spillways from dams (outside the dam area only), or other concentrations without causing damage by erosion or flooding.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where: (1) excess surface water needs to be disposed of; (2) a buried outlet is needed for Diversions (362), Terraces (600), or similar practices; (3) an underground outlet can be installed that will safely dispose of excess water; and (4) surface outlets are impractical because of stability problems, climatic conditions, land use, or equipment traffic.

DESIGN CRITERIA

Capacity. The underground outlet shall be designed, alone or in combination with other practices, with adequate capacity to insure that the terrace, diversion, or other practices function according to the standard for the specific practice. For example, an underground outlet can be used in combination with a grassed waterway or a surface drain to carry part of the design flow. The capacity of the underground outlet for natural basins shall be adequate for the intended purpose without causing excessive damage to crops, vegetation, or improvements.

Inlet. An inlet can be a collection box, a perforated riser, or other appropriate device. Its capacity shall be adequate to provide the maximum design flow in the conduit. Flow-control devices shall be installed as necessary. The minimum diameter of vertical inlets shall be 4 inches. Perforated risers must be of durable material, structurally sound and resistant to damage by rodents or other animals. If flexible tubing is used for the vertical inlet, it shall be adequately supported to maintain vertical alignment. If burning of vegetation is likely to create a fire hazard, the inlet shall be fire resistant. Blind inlets can be used where they are effective. Collection boxes must be large enough to facilitate maintenance and cleaning operations. The inlet must have an appropriate trash guard to insure that trash or other debris entering the inlet passes through the conduit without plugging. It must also have an animal guard to prevent the entry of rodents or other animals.

Perforations in the inlet shall be smooth, without burrs on projections that will collect trash. To compensate for possible plugging of some of the perforations, slots or holes shall be uniformly spaced and shall be adequate to provide twice (2 times) the design flow.

Pressure-relief wells shall be designed and installed as needed to control pressure. If junction boxes and other structures are needed, they shall be designed and installed in a manner that facilitates cleaning and other maintenance activities.

Hydraulics. Underground outlets shall be continuous conduits, tubing, or tile. Joints shall be hydraulically smooth, and the materials and methods used shall be recommended by the manufacturer. If a pressure system is used, joints shall be adequate to withstand the design pressure, including surges and vacuum. The maximum velocity must not exceed the safe velocity for the conduit materials and installation.

Lines shall be adequate to carry the design flow when the outlet and all inlets are operating at design capacity. Capacity shall be based on the pipe size or on other flow control devices to prevent water from the upper inlets from discharging through the lower inlets. The minimum conduit diameter shall be 3 inches.

Materials shall meet or exceed the design requirements against leakage and shall withstand internal pressure or vacuum and external loading. Plastic, concrete, aluminum, and steel shall meet the requirements specified in the applicable ASTM standard. All materials specified for Subsurface Drains (606) can be used for underground outlets. Conduits, however, can be perforated or nonperforated, depending on the design requirements.

Maximum grades, maximum and minimum velocities, and joint protection will comply with subsurface drain (606) standards. At least eight feet of sealed conduit shall be installed immediately downstream from any riser.

Outlet. The outlet shall be sufficiently stable for all anticipated flow conditions. It shall be designed for the maximum anticipated water surface at design flow. A continuous section of closed conduit or a headwall can be used at the outlet. If a closed conduit is used, it shall be durable and strong enough to withstand all anticipated loads, including those caused by ice. If fire is a hazard, the outlet shall be fire resistant. All outlets near ponds, outlet channels, or streams where water is normally present must have animal guards to prevent the entry of rodents or other animals. Animal guards must be hinged to allow passage of debris.

Protection. Before the outlet is installed, all disturbed areas shall be reshaped and regraded so that they blend with the surrounding land features and conditions. Visual resources must be given the same consideration as other design features. Areas that are not to be farmed or covered by structural works shall be established to vegetation or otherwise protected from erosion as soon as practicable after construction.

Maintenance. Underground outlets shall be maintained by keeping inlets, trash guards, and collection boxes and structures clean and free of materials that can reduce the flow. All leaks shall be repaired promptly to insure proper functioning of the conduit. Animal guards must be inspected periodically and maintained in proper working order.

PLANNING CONSIDERATIONS

Food Security Act, Swampbuster, and Section 404 of the Clean Water Act provisions must be considered prior to providing assistance on Underground Outlet.

Water Quantity

1. Consider effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
2. Consider effects on the volume of downstream flow that might cause undesirable environmental, social, or

economic effects.

Water Quality

1. Evaluate potential use for water management.
2. Consider effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances that would be carried by runoff.
3. Consider effects on the visual quality of downstream water resources.
4. Consider sediment-attached and construction-related effects on the quality of downstream water courses.
5. Consider effects on wetlands or water-related wildlife habitats

PLANS AND SPECIFICATIONS

Plans and specifications for installing underground outlets shall be in keeping with this standard and shall describe the requirements for installing the practice to achieve its intended purpose.

UNDERGROUND OUTLET SPECIFICATIONS

Conduits appurtenances shall be installed to the line and grade shown in the plans or as staked in the field and according to the recommendations of the manufacturers. Conduits shall be bedded and backfilled as shown in the plans or as described in the specifications for the job. Mechanical compaction, waterpacking, or other means of compaction shall be specified in the plans or in the specifications for the job.

MATERIALS

Materials for underground outlets shall meet the requirements shown in the plans. They shall also be field inspected for any deficiencies such as thin spots and cracking prior to installation.

TRENCH EXCAVATION

Trench excavation shall be sufficient to provide required cover after other construction is completed. The cover over all conduit lines except metal pipe shall be 24 inches or more. The cover over metal pipe shall be 12 inches or more.

The bottom of the trench shall be grooved in the center for proper conduit bedding. Maximum trench width shall be 24 inches measured 12 inches above top of conduit. Minimum trench width shall be conduit diameter plus four (4) inches except when trench is shaped to fit the conduit, additional width is not required.

INSTALLATION

The underground outlet system shall be installed to the line and grade shown in the plans or staked in the field and according to manufacturer's recommendations. Conduit lines shall be installed and properly backfilled prior to placement or earth fill for the storage basin or terrace ridge.

Provide at least 2 inches of compacted earth or sand filter bedding when the conduit line is to be installed in a rock trench or where rock is exposed in the trench bottom.

The conduit size shall not be changed except at the tee joint where an intake is connected to the line. The tee must be the same size as the conduit downstream.

Conduit lines shall be joined with standard factory couplers, if applicable, to produce a continuous system. Internal couplers may be used if they do not cause excessive flow restrictions. Conduit ends shall be protected during installation.

All appurtenant structures, including trash and

animal guards, shall be installed promptly and provisions shall be made for protecting them during installation. All conduit ends except the outlet and inlets with screens shall be capped with standard factory end caps or concrete. When corrugated plastic tubing is used, no more than 5 percent stretch will be allowed. Orifice plates, when specified, shall have smooth edges and fit tightly.

TRENCH BACKFILL

Conduits shall be bedded and backfilled throughout the base width of the basin embankment or terrace ridge. Friable soil material shall be placed in 6 inch layers and hand tamped to a depth of approximately 18 inches. The sides of the remaining trench shall be sloped no steeper than 3 horizontal to 1 vertical and backfill placed in 6-inch layers and machine compacted.

The remaining conduit shall be blinded and backfilled in accordance with subsurface drain (606).

FINISH

Work areas shall be restored to their former condition or as directed in the field. Vegetation or other protective cover shall be established promptly.

CHECK FOR COMPLETION

Underground outlets shall be checked for completion in accordance with TR-62.